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### **REMARKS**

Reconsideration is respectfully requested in view of the amendments and remarks herein.

#### **Status of Claims**

Claims 1, 20-24, 46-72 and 74-97 are pending.

Claims 1, 20-24, 47-71 and 78-95 stand rejected.

Claims 46, 72 and 74-77 stand objected. In this regard, applicants point out that the Continuation Sheet of the Advisory Action dated June 6, 2005, indicates that the rejection of claim 46 has been withdrawn. Applicants also point out that they have amended claim 72 in a different manner in this Amendment than in the Response to the final Action.

Claims 2-19, 25-45 and 73 are cancelled.

Claims 96-98 are new.

#### **Claims 1, 20-24, 47-63, 66-71 and 78-95 - 35 U.S.C. § 103(a)**

Claims 1, 20-24, 47-63, 66-71 and 78-95 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Morris et al., U.S. Patent No. 2,520,733 (hereinafter "Morris"), in view of Wagner et al, WO 98/27123 (hereinafter "Wagner"), corresponding to U.S. Patent No. 6,187,898 B1. Applicants' comments concerning Wagner are based upon the counterpart U.S. patent.

Amended claim 1 is directed to a continuous process of making polytrimethylene ether glycol comprising: (a) continuously providing 1,3-propanediol reactant and polycondensation catalyst; and (b) continuously polycondensing the 1,3-propanediol reactant to polytrimethylene ether glycol in a column reactor having two or more reaction stages.

Claim 65 is directed to the process of claim 1 wherein the polycondensation is carried out in a reactor equipped with a heat source located within the reaction medium.

Claims 66-68 recite that the reactor is a column reactor having 3-30, 4-20 and 8-15 stages, respectively. Claim 67 specifies that the column reactor is a vertical column reactor.

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Claim 69 is directed to the process of claim 1 wherein the 1,3-propanediol reactant is fed at multiple locations to the reactor.

Claim 70 is directed to the process of claim 1 wherein an inert gas is added to the reactor at one or more stages.

Claim 71 is directed to the process of claim 1 wherein water vapor is generated as a by-product of the reaction and is removed from the reactor in at least one intermediate stage.

Claim 83 is directed to a continuous process of making polytrimethylene ether glycol comprising: continuously polycondensing a 1,3-propanediol reactant to polytrimethylene ether glycol in a reactor at a pressure of less than one atmosphere. Claims 84-89 depend directly or indirectly from claim 83. Claims 84 and 85 recite that polycondensation is carried out at pressures of less than 500 and 250 mm Hg, respectively. Claim 54 depends from claim 1 and recites that polycondensation is carried out at a pressure of less than one atmosphere. Claims 55-59 depend directly or indirectly from claim 83. Claims 55 and 56 recite that polycondensation is carried out at pressures of less than 500 and 250 mm Hg, respectively, and claims 57-59 depend therefrom. Claim 63 recites that the polycondensation pressure is between 50 and 250 mm Hg.

Morris is cited as teaching preparation of polymers and copolymers of 1,3-propanediol. The Action states that the invention is directed to a continuous process, whereas Morris is directed to a batch process. The Action also recognizes that the invention of claim 1 and the claims dependent thereon is directed to use of a reactor having two or more reaction stages. The Action cites Wagner as teaching a method for polycondensing a monomeric starting material with a reactor having at least two stages.

There seem to be no comments specifically directed to independent claim 83 in the Action. However, the Action points to Morris disclosing that water is removed under sub atmospheric pressure at column 6, lines 54-60, and that Wagner mentions a pressure of 0.01 to 100 bar at column 5, lines 31-45.

Applicants traverse this rejection for the reason that Morris is directed to a batch process and Wagner does not teach or suggest modifying the batch process of Morris to arrive at the claimed invention.

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First, applicants submit that the reactions described in Wagner are quite different from those of the claimed invention or Morris and thus Wagner would not lead to modifying the process of Morris as suggested.

In addition, Applicants submit that the rejection of claim 1 and the claims dependent thereon should be withdrawn because those claims are directed to continuously *polycondensing* the 1,3-propanediol reactant to polytrimethylene ether glycol in a *column reactor having two or more reaction stages*, whereas Morris is directed to a batch reaction and Wagner is directed to carrying out a reaction in two or more stages, not to continuously *polycondensing* a reactant to polytrimethylene ether glycol in a *column reactor having two or more reaction stages*.

Further, Applicants submit that the rejection of Claims 54-59, 63 and 83-89 should be withdrawn since Morris is teaching using standard pressure and all of the examples in Wagner are directed to use of high pressures. Thus, the person of ordinary skill in the art would not be led to modify the process of Morris based upon the disclosure of Wagner.

Specific comments directed to other claims are presented below.

#### All the Rejected Claims

Applicants submit that Morris is focused on preparing polytrimethylene glycol using a batch process and that the reactions described in Wagner are quite different from those of the claimed invention or Morris, so that for this reason alone, the rejection should be withdrawn.

Morris is focused on preparing polytrimethylene glycol using a batch process. The polytrimethylene glycol is prepared by heating 1,3-propanediol and/or its derivatives using dehydration catalysts, such as sulfuric acid, phosphoric acid and sulfonic acids. (See, e.g., column 4, lines 31-40.) The preferred temperature range is 170-225°C. (Column 6, lines 11-13.) Polymerization is carried out by disposing all of the reactants in a vessel and heating with continuous or intermittent distillation of water. (Column 6, line 23 *et seq.*) Following polymerization, the product is usually purified by (a) removal of catalyst and dehydration. (Column 6, lines 39-66.) Morris' examples show preparing trimethylene glycol by a batch process using various catalysts and producing trimethylene glycol polymers having molecular weights of from 216 to 1,095. Thus, Morris does not teach or suggest a continuous process according to the invention.

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Wagner is directed to a method for carrying out polycondensation reactions for preparing polymers that are very different than the polytrimethylene ether glycol of the invention. For instance, maleic acid is used to make polysuccinimide. Contrary to the statements in the Action, polyol is not a primary starting material. It is simply a "cocondensable" compound mentioned in US 6,187,898 B1, column 2, line 23 *et seq.* The preferred starting material is described in US 6,187,898 B1, column 2, lines 13-19 as the reaction product of 1,4-butanedicarboxylic acid or 1,4-butenedicarboxylic or a derivative thereof with ammonia or with a compound supplying ammonia. Other starting materials are described as maleic anhydride, fumaric acid, malic acid, aspartic acid, asparagines and mixtures thereof. (See, e.g., US 6,187,898 B1, column 2, lines 20-25.) Thus, the reactions described in Wagner are quite different from those of the claimed invention, and the person of ordinary skill in the art would not be led to modify of the process of Morris based upon the disclosure of Wagner.

Claim 1 and The Claims Dependent Thereon

Applicants submit that the rejection of claim 1 and the claims dependent thereon should be withdrawn because those claims are directed to continuously *polycondensing* the 1,3-propanediol reactant to polytrimethylene ether glycol in a *column reactor having two or more reaction stages*, whereas Morris is directed to a batch reaction and Wagner is directed to carrying out a reaction in two or more stages, not to continuously *polycondensing* a reactant to polytrimethylene ether glycol in a *column reactor having two or more reaction stages*. Thus, combining Morris and Wagner would not lead to the process of these claims.

Morris is focused on preparing polytrimethylene glycol using a batch process. The polytrimethylene glycol is prepared by heating 1,3-propanediol and/or its derivatives using dehydration catalysts, such as sulfuric acid, phosphoric acid and sulfonic acids. (See, e.g., column 4, lines 31-40.) Polymerization is carried out by disposing all of the reactants in a vessel and heating with continuous or intermittent distillation of water. (Column 6, line 23 *et seq.*) Following polymerization, the product is usually purified by (a) removal of catalyst and dehydration. (Column 6, lines 39-66.) Morris' examples show preparing trimethylene glycol by a batch process using various catalysts and producing trimethylene glycol polymers having

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molecular weights of from 216 to 1,095. Thus, Morris does not teach or suggest a continuous process according to the invention.

In addition, applicants point out that step (b) of the invention is directed to continuously *polycondensing* the 1,3-propanediol reactant to polytrimethylene ether glycol in a *column reactor having two or more reaction stages*. Wagner is directed to carrying out a reaction in two or more stages, not to continuously *polycondensing* a reactant to polytrimethylene ether glycol in a *column reactor having two or more reaction stages*. Thus, even if Wagner is considered pertinent, it doesn't show the same type of reaction or use of a column reactor as claimed.

Concerning this point, applicants point to the fact that Wagner describes use of a pre-reactor and a high-viscosity reactor. Wagner describes the pre-reactor as being any apparatus suitable for heat exchange and having an operating capacity sufficient for carrying out the chemical reaction, such as a tube-bundle heat exchanger, a falling-film evaporator, a plate heat exchanger, a temperature controlled static-mixer reactor, a mixing vessel, etc. For the high-viscosity reactor, Wagner indicates a preference for using a helical-tube evaporator, or another heat exchanger in combination with a helical-tube reactor. These teachings would not lead the person of ordinary skill in the art to modify the batch process of Morris to arrive at the claimed invention. Applicants wish to emphasize that since Wagner fails to teach use of a column reactor, the cited documents can not be combined to arrive at the claimed invention.

#### Claim 65

Claim 65 is directed to the process of claim 1 wherein the polycondensation is carried out in a reactor equipped with a heat source located within the reaction medium. Column 2, lines 54-56, of Wagner specifically discloses the reaction carried out with external supply of heat in a reactor. Therefore, Applicants submit that Wagner does not teach the invention of this claim or how to modify the batch process of Morris to arrive at this invention.

#### Claims 69

Claim 69 is directed to the process of claim 1 wherein the 1,3-propanediol reactant is fed at multiple locations to the reactor. Applicants submit that Wagner does not teach the invention of this claim or how to modify the batch process of Morris to arrive at the claimed invention.

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Claim 70

Claim 70 is directed to the process 1 wherein an inert gas is added to the reactor at one or more stages. Applicants submit that Wagner does not teach the invention of this claim or how to modify the batch process of Morris to arrive at this invention.

Claim 71

Claim 71 is directed to the process of claim 1 wherein water vapor is generated as a by-product of the reaction and is removed from the reactor in at least one intermediate stage. Applicants submit that Wagner does not teach the invention of this claim or how to modify the batch process of Morris to arrive at this invention.

Claims 54-59, 63 and 83-89

Claim 83 is directed to a continuous process of making polytrimethylene ether glycol comprising: continuously polycondensing a 1,3-propanediol reactant to polytrimethylene ether glycol in a reactor at a pressure of less than one atmosphere. Claims 84-89 depend directly or indirectly from claim 83. Claims 84 and 85 recite that polycondensation is carried out at pressures of less than 500 and 250 mm Hg, respectively. Claim 54 depends from claim 1 and recites that polycondensation is carried out at a pressure of less than one atmosphere. Claims 55-59 depend directly or indirectly from claim 83. Claims 55 and 56 recite that polycondensation is carried out at pressures of less than 500 and 250 mm Hg, respectively, and claims 57-59 depend therefrom. Claim 63 recites that the polycondensation pressure is between 50 and 250 mm Hg.

There seem to be no comments specifically directed to independent claim 83 in the Action. However, the Action points to Morris disclosing that water is removed under sub atmospheric pressure at column 6, lines 54-60, and that Wagner mentions a pressure of 0.01 to 100 bar at column 5, lines 31-45.

Applicants point out that Morris column 6, lines 54-60, is describing a purifying step carried out after polymerization. Column 6, lines 39-65, state that the purification first involves removal of catalyst and then dehydration. Distillation using subatmospheric pressure is given as one procedure for removing the last traces of water. Thus, Morris is not teaching carrying out polycondensing a 1,3-propanediol reactant to polytrimethylene ether glycol in a reactor at a pressure of less than one atmosphere.

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The teachings of Wagner are made with respect to a much different process than the process of the claimed invention, and therefore the person of ordinary skill in the art would not modify the teachings of Morris based thereon.

Wagner, at column 5, lines 31-45, mentions use of pressure of from 0.01 to 100 bar in the pre-reactor and 0.01 to 10 bar in the high viscosity reactor. The Examples of Wagner, however, don't show pressures of low pressure. In fact, the only pressures mentioned are high pressures. Example 1, column 7, line 39, shows a pre-heater pressure of 10 bar and column 7, line 43, shows a tube evaporator being used at a pressure of 2.9 bar. In addition, Example 2, column 8, line 20, shows the pre-heater being operated at a pressure of 45 bar and column 8, line 24, shows a helical-tube evaporator being operated at 7.8 bar. Thus, the person of ordinary skill in the art would be led to use high pressures based upon Wagner and would be led away from modifying the teachings of Morris to use low pressure based upon Wagner.

Applicants also wish to point out the inconsistency in this rejection with the allowance of the claims of USSN 09/738,688, and respectfully request that they be allowed.

In summary, applicants submit that the teachings of Wagner are made with respect to a much different process than the process of the claimed invention, and therefore the person of ordinary skill in the art would not modify the teachings of Morris based thereon. Second, Wagner's examples don't show use of low pressure, and in fact show use of high pressures, so they would lead the person of ordinary skill in the art to away from the claimed invention. Since Morris is teaching carrying out the reaction at ambient pressure and Wagner indicates a preference for high pressures in its examples, then these documents lead the person of ordinary skill in the art away from the claimed invention. Applicants also wish to point out the inconsistency in this rejection with the allowance of the claims of USSN 09/738,688, and respectfully request that they be allowed. For these reasons, applicants submit that the rejection of these claims should be withdrawn.

#### Summary

In summary, Applicants traverse this rejection for the reason that Morris is directed to a batch process and Wagner does not teach or suggest modifying the batch process of Morris to arrive at the claimed invention. First, applicants submit

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that the reactions described in Wagner are significantly different from those of the claimed invention or Morris and thus Wagner would not lead to modifying the process of Morris as suggested. Second, Applicants submit that the rejection of claim 1 and the claims dependent thereon should be withdrawn because those claims are directed to continuously *polycondensing* the 1,3-propanediol reactant to polytrimethylene ether glycol in a *column reactor having two or more reaction stages*, whereas Morris is directed to a batch reaction and Wagner is directed to carrying out a reaction in two or more stages, not to continuously *polycondensing* a reactant to polytrimethylene ether glycol in a *reactor having two or more reaction stages*. Further, Applicants submit that the rejection of Claims 54-59, 63 and 83-89 should be withdrawn since Morris is teaching using standard pressure for polycondensing and all of the examples in Wagner are directed to use of high pressures, indicating a preference for use of high pressure. Thus, the person of ordinary skill in the art would not be led away from carrying out the claimed process by the teachings of these documents. Lastly, Applicants submit that Wagner does not contain any disclosure concerning that would lead the person of ordinary skill in the art to modify the process of Morris to arrive at the inventions claimed in the other enumerated claims.

For the above reasons, applicants respectfully request withdrawal of the rejection of claims 1, 20-24, 47-63, 66-71 and 78-95 under 35 U.S.C. § 103(a) as over Morris in view of Wagner.

**Claim 64-35 USC 101**

Claim 64 was rejected under 35 USC 101. This claim was cancelled, so this rejection is moot.

**Claims 72-77-Objection**

The Action indicates that claims 72-77 are allowable, but must be redrafted in independent form. Applicants have amended these claims so that they are in independent form, but in a different manner than in the Response to the final Action.

**New Claims**

Applicants present herewith new claims 96-98. They are based upon claims 1 and 83, and find additional support at page 13, line 30 et seq. Entry and consideration are respectfully requested.



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**CONCLUSION**

In view of the present amendments and the above remarks, Applicants respectfully submit that all of the remaining claims are patentable and in condition for allowance. Accordingly, prompt favorable action is earnestly requested.

The Commissioner is hereby authorized to charge any fee deficiency or credit any additional charges to Deposit Account No. 04-1928 (E.I. du Pont de Nemours and Company).

Respectfully submitted,

Date: June 29, 2005

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